

## **ACTIVE PHOTONIC BAND-GAP OPTICAL FIBER**

### **ABSTRACT OF THE INVENTION**

A plurality of active gain material (93) is disposed in an active interface portion (44) of a dielectric band-gap cladding confinement region (22) adjacent to a dielectric core (12) of a photonic band-gap crystal fiber (20), wherein during operation, the plurality of active gain material (93) absorbs the pump energy and stores the pump energy as a potential energy storage for stimulation by EM energy in a second guided mode at a second frequency in a second range of frequencies for overlapping with the first guided mode of the core (12) such that the surface defined by an interface between the photonic band-gap cladding (22) and the dielectric core (12) that supports at least one surface mode propagating at that interface (44) overlaps the active interface portion of the dielectric cladding confinement region and a state associated with the dielectric core (12).